

## ON THREE NEW SPECIES OF EUCALYPTUS.

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(Plates xx.-xxii.)

EUCALYPTUS SMITHII, n.sp.

(Plate xx.)

A tall tree sometimes attaining a height of 150 feet and a diameter of from 2 to 4 feet. Bark on old trees deeply furrowed and dark grey to blackish, standing between a Stringybark and an Ironbark, but smooth above 10 or 12 feet from the ground to the branches. Young leaves *sessile*, lanceolate or rounded at the base, resembling *E. viminalis*, 5 or 6 inches long, not glaucous. Mature leaves narrow, lanceolate, acuminate, of an equal colour on both sides, not shining, venation not very distinct; lateral veins fine, numerous; intramarginal vein close to the edge; petiole about an inch long. Oil glands very numerous. Peduncles axillary, flattened, about as long as the petiole, with numerous flowers, from 3 to 15. Calyx turbinate, narrowing into a short petiole, the whole 3 to 4 lines long. Operculum hemispherical, shortly acuminate. Stamens all fertile. Anthers kidney-shaped. Ovary flat-topped.

Fruits inclined to hemispherical, occasionally pyriform, 2 to 3 lines in diameter; rim domed, sometimes expanding into a flange; valves exerted, obtuse.

*Hab.*—Sugar Loaf Mountain, Monga and Irish Corner Mountain. Braidwood (W. Bäuerlen).

This tree as at present known is restricted to a few localities in the south-eastern district of the Colony, and occurs as far as seen on high, steep mountain sides, where it attains its maximum height, 200 feet. The bark is usually smooth except for about 10 feet of the trunk, and peels off in long narrow ribbons as in the

case of *E. viminalis*, Labill., and other Eucalypts. The colour of the smooth bark is bluish or various shades of grey; that of the *persistent* bark is of a rich brown or chocolate colour on very old trees and is grey to black like Ironbark and at times nearly as deeply furrowed, approaching in that respect old trees of *E. Sieberiana*, from which, however, in other respects it is quite different. The base bark is very thick and hard. In aspect this tree much resembles *E. fraxinoides*, Deane et Maiden, but the rough bark runs somewhat higher than in that species, is often more grey in colour and of about the same thickness. It is easily known from *E. fraxinoides* by its foliage, buds, fruits, timber, oil, and kino. This tree never has the insect markings so conspicuous as on *E. fraxinoides*.

In none of its aspects would this tree ever be regarded as any of the "Stringybarks." Some of the younger trees have quite smooth bark, which on older trees is even rougher than that of *E. Sieberiana*, F.v.M., and from this feature might be called an "Ironbark," but never a "Stringybark."

It differs from *E. Sieberiana*, F.v.M., in the venation of the leaves, and in the buds, fruits, timber and oil.

The bark has a peculiarly strong, pleasant odour. In making a cross section it has a very peculiar appearance, having a number of streaks or rays of a pithy substance, yellow in colour, radiating from the sapwood outwards to the circumference of the bark (W. Bäuerlen).

In botanical sequence it probably should be placed between *E. Bäuerleni*, F.v.M., and *E. viminalis*, Labill., as in the young state the leaves belong to what may be called the "Viminalis Group" and are quite different from those of the "Stringybark Group."

The venation and shape of the mature leaves, and the fruits distinguish it at once from *E. amygdalina*, Labill., from which also it differs in timber and oil. The presence of mamma on this tree shows it also to have no connection with the "Stringybarks." The renantherous anthers in this species are an anomaly.

**Timber.**—The wood is very hard, close-grained, and of a pale brown colour and can be placed amongst the pale hardwoods of the colony. There are no data as to its durability or seasoning qualities, but it probably ranks with “Blackbutt,” *E. pilularis*, Sm.

**Kino.**—The kino gives a turbid solution in cold water and contains eudesmin but not aromadendrin. This is an instance of a turbid kino produced by a tree whose anthers are kidney-shaped or belong to the section *Renantheræ* of the Eucalypts. *E. microcorys*, F.v.M., was previously the only exception to the apparent rule that Eucalypts with kidney-shaped anthers gave a kino free from eudesmin or aromadendrin, or in other words were not turbid kinos. The turbidity or otherwise of a kino is therefore no criterion as to the botanical classification of the Eucalypts on the anthereal system (H. G. Smith.)

**Manna.**—In the chemistry of the oil and kino this tree approaches *E. punctata*, DC., and a further resemblance is shown in that manna has been obtained from it; this differs in no respects from the manna of *E. punctata*.

**Oil.**—The oil is very rich in eucalyptol, and it also contains eudesmol in small quantities. From several distillations the average yield was 1.354 per cent., and when the quality of the oil is considered this yield is very gratifying. The oil is one of the richest in eucalyptol yet distilled at this Museum, being even richer in that constituent than the oil of the Sydney *E. punctata*, DC. No phellandrene is present, the oil consisting almost entirely of dextro-pinene and eucalyptol. Being free from constituents having a high specific gravity, the specific gravity of the oil is comparatively low, although containing over 70 per cent. of eucalyptol.

This species is named in honour of my colleague, Mr. H. G. Smith, F.C.S., whose labours in the field of organic chemistry have added much to the knowledge of the economics of the genus *Eucalyptus*, and have so materially assisted me in diagnosing the new species described by me.

## EUCALYPTUS DAWSONI, sp.nov.

(Syn. *E. polyanthema*, Schau., var. (c), mihi, Proc. Linn. Soc. N.S.W., 1896, p. 448.)

## "Slaty Gum."

(Plate xxi.)

A tall tree with a smooth bark, the foliage, branchlets, buds and fruits glaucous. Young leaves broadly lanceolate, 6 inches long and over 3 inches wide, on a petiole over an inch long, very obtuse, glaucous on both sides, venation distinct. Mature leaves mostly short, oblong-lanceolate, very obtuse, rarely acuminate, occasionally reddish in colour, venation fairly distinct, lateral veins not distant, intramarginal vein close to the edge. Peduncles axillary but mostly in large terminal corymbs, exceeding the leaves. Buds on *young trees* 3 lines long,  $1\frac{1}{2}$  lines in diameter, sessile or on short pedicels; operculum hemispherical, obtuse; on mature trees 4 to 5 lines long, 1 line in diameter, the calyx tapering into a filiform pedicel, operculum conical, acute. Ovary domed at the summit. Stamens all fertile, inflexed in the bud, filaments thick in proportion to the diameter of the anthers. Anthers very small, cylindrical, rounded at the base and truncate at the top, opening by terminal pores.

Fruit small, turbinate, pedicel almost filiform, mostly a line in diameter and under 2 lines long, rim thin, capsule sunken, valves not exerted.

This species is one of the finest representatives of the genus *Eucalyptus*, whether from a picturesque or an economic point of view. On the whole watershed of the Goulburn River it grows to a great height with a splendidly straight, branchless trunk, and always occurs under the ridges, never being found on the summit nor at the base; and owing to its glaucous leaves it can easily be detected from the dark green foliage of its congeners—the Stringybarks in this particular instance.

I was at one time (*loc. cit.*) inclined to class this species as a variety of *E. polyanthema*, Schau., owing to the similarity of fruit

and colour of timber, but a further examination of the various parts of the tree and the aid of chemistry have led me to alter my earlier opinions.

The sucker and mature leaves of both species are different as well as the venation. The leaves of "Slaty Gum" are almost always glaucous as well as the buds and fruits, a feature rarely found in *E. polyanthema*, Schau. The timber is of excellent quality and equal to Ironbark in durability; in fact I half suspect that this species is the "Grey Gum-tree" of W. Hill referred to by Baron von Mueller (*Eucalyptographia*, Decade iv.) and placed under *E. crebra*, F.v.M. The fruits and the timber of the two species certainly are similar, but they agree in no other character and therefore should not be confounded.

The differences between it and *E. largiflorens*, F.v.M., are found in the venation, shape of fruits, *anthers*, size and habitat of tree, and quality of timber, as well as the chemical constituents of the oil.

According to Bentham's antheral system, this species is placed in the section Porantheræ of the Eucalypts. The shape of the leaves allies it with *E. largiflorens*, F.v.M., and the fruits to *E. crebra*, although this latter species belongs to the section Parallel-antheræ of Eucalypts. The smooth bark and reddish timber give it some affinity with *E. polyanthema*, but it differs from this species in other characters and products. It is, however, more closely allied to *E. polyanthema* and *E. largiflorens* than to any other species, and in botanical sequence is placed after the former.

**Timber.**—The timber varies in colour from pinkish to the dark red shade of the "Broad-leaved Ironbark," *E. siderophloia*, Benth., from which timber it is often impossible to distinguish it either macroscopically or microscopically. It is a very hard, close, straight-grained timber, possessing all the qualities of our most durable and valuable "Ironbarks."

"In lower ground, or the valleys between hills where the rock appears more decomposed, it rises to 100 or 120 feet, and is a fine tree. The wood of the Slaty Gum is considered by practical men to be as good and durable as Ironbark. It is red in colour, easily

worked, and exceedingly strong, being well adapted for weather-boards, fencing, wheelwrights' work, railway sleepers, rough carpentry, and bridges. I saw in the neighbourhood of Mudgee several bridges which had been constructed of Slaty Gum, and, as they had stood for many years without any apparent decay, there was certainly a good proof that the wood bears exposure to all weathers." (Rev. Dr. W. Woolls).

**Oil.**—The yield of oil is poor, averaging only .172 per cent. Its specific gravity is .9414 at 15° C. This oil is a remarkable one and distinctly different from any other Eucalypt oil yet distilled at this Museum. It contains no eucalyptol, but a fair percentage of phellandrene is present. The principal constituent appears to be a sesquiterpene. Although at present apparently useless for commercial purposes, yet it has great scientific interest, and further inquiries are now being undertaken respecting it.

**Kino.**—This exudation gives a turbid solution in cold water, and it was found to contain eudesmin but not aromadendrin. The anthers opening by pores point to the fact that Eucalypts having these anthers do not necessarily exude a kino free from eudesmin and aromadendron, or, in other words, may give turbid kinos. Fresh material and some that had been in the Museum for 10 years gave exactly the same chemical results (H. G. Smith).

*Pathological Note.*—A remarkable entomological feature in connection with this species is perhaps worthy of note. At certain seasons of the year the leaves of this tree alone are affected by a species of *Psylla*; the insects eat off the cuticle of the leaves, giving the whole country side an appearance in the distance as if a bush fire had passed over it.

The species is named after Mr. James Dawson, L.S., of Rylstone, who was the first to draw my attention to the qualities of the timber of this species, and who aided me in procuring botanical and other material for its diagnosis.

*Hab.*—Ridges on the watershed of the Goulburn River, (R.T.B.) across the main "Divide" at Cassilis and north-west to Pillaga (Prof. Warren).

It occurs probably at or near Yass, as I have some fruits of this species with that locality queried.

EUCALYPTUS CAMPHORA, sp.nov.

“Sallow” or “Swamp Gum.”

(Plate xxii.)

A rather small tree, about 20 to 30 feet high, with a black decorticating bark. Young leaves ovate, obtuse, under 6 inches long,  $3\frac{1}{2}$  inches broad, on angular petioles of  $\frac{1}{2}$  inch, coriaceous, glaucous. Mature leaves ovate-elliptical, abruptly acuminate, under 4 inches long, or lanceolate, acuminate and 6 inches long; thinly coriaceous, glaucous, venation distinct, particularly so in young leaves, intramarginal vein removed from the edge. Peduncles few, axillary, flattened, bearing 5 or 6 shortly pedicellate or sessile buds. Calyx turbinate, inclining to hemispherical, 1 line long, 1 line broad; operculum acuminate, about 2 lines long. Ovary domed. Anthers parallel, opening by longitudinal slits.

Fruits small, turbinate, 3 lines long, 2 lines in diameter, rim flat, valves exerted.

It is a very umbrageous tree, attaining a height from 30-60 feet and a diameter up to 3 feet, usually rather crooked and essentially a swamp or wet ground species. Occurs also on the banks of creeks or rivers, as for instance at Delegate on the banks of the Delegate River, usually associated with *E. stellulata* and *E. paludosa*. From the former it is quite easily distinguished by its leaves, although otherwise in appearance of growth, branches, bark, &c., the two resemble each other somewhat. Its branches never have, however, that yellow-green colour which distinguishes *E. stellulata* so readily, but are of an ashy-grey or brownish-grey colour, sometimes approaching even to a sooty-black. The persistent bark is also of a different texture, while in *E. stellulata* on very old trees it approaches almost that of an Ironbark. From *E. paludosa*, R.T.B., it is easily distinguished, especially in older trees, but the leaves are broader and rounder, often considerably broader than long, and the apex quite blunt, sometimes obcordate. The leaves on the higher branches approach more those of *E.*

*melliodora* than perhaps those of any other species. *E. paludosa* is not so essentially a swamp or wet ground species, as it occasionally occurs on dry ground; it also grows a larger tree and is more apt to be straight than this new species; the persistent bark is also quite different and decorticates in long flakes. When young trees of it and *E. paludosa* are seen growing in company the two are not likely to be confounded, as the young leaves and bark of each species are quite different.

Like *E. paludosa*, it has very probably been classified with *E. Gunnii*, Hook. f., but it differs from this latter species in leaves, fruits, timber, oil, &c. The colour of the bark and the disposition of the buds bear some resemblance to *E. stellulata*, but it does not resemble it in any other characters.

**Timber.**—The timber is blackish and of very little value, whilst that of *E. paludosa* is much harder and more durable and of a lighter colour. In botanical sequence it probably follows *E. paludosa*. Oil glands have been recorded as occurring in many parts of Eucalyptus trees, but it has probably never been found before to occur in the anther connective as in this species. This feature is shown in Plate xxi., fig. 6.

**Oil.**—The most important economic product of this tree is its essential oil. On rectification this oil was found to contain a fraction boiling between 280°-290° C., equalling 18 per cent. of the whole, and which consisted almost entirely of eudesmol, comparatively in a pure condition. The fraction wholly crystallised in less than one hour. This oil appears to be free from bodies, also of high boiling point, that have previously been found to interfere with and to make the purification of this stearoptene difficult. If eudesmol should be found eventually to be of medicinal value, or useful for other purposes, we have in this oil a most prolific source of the material.

The average yield of the oil is .398 per cent. It consists of eudesmol, pinene and eucalyptol. No phellandrene was detected. The specific gravity of the crude oil is .9167 at 15° C.

For the chemistry of this camphor see a forthcoming paper by H. G. Smith, F.C.S., in Proc. Roy. Soc. N.S.W. for 1899.



**Kino.**—No specimen of this body has yet been obtained.

*Hab.*—It was first discovered by me at Ganguddy Creek, Kelgoola, Rylstone, in 1895, and afterwards in 1897 at Narango. It has since been found at Delegate (Hayden's Bog; W. Bäuerlen). It also occurs near Tumut. As these latter localities are distant 300 and 200 miles respectively from where it was originally discovered, and the botanical and economic characters never seem to vary, it thus stands as a very constant species.

*Pathological Note.*—The leaves from the three above localities not only resemble each other exactly, but are all affected apparently by the same species of insect—evidenced by numerous uniform black spots.

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EXPLANATION OF PLATES.

Plate xx.

*Eucalyptus Smithii.*

- Fig. 1.—Sucker-leaves.  
 Fig. 2.—Twig, with mature leaves and buds.  
 Fig. 3.—Section of bud (enlarged).  
 Fig. 4.—Anther (enlarged).  
 Figs. 5-9.—Fruits.

Plate xxi.

*Eucalyptus Dawsoni.*

- Fig. 1.—Young leaves.  
 Fig. 2.—Terminal twig, with buds.  
 Fig. 3.—Acuminate leaf (rare form).  
 Fig. 4.—Buds of a young tree 15 feet high.  
 Fig. 5.—Section of bud (enlarged).  
 Fig. 6.—Anthers (enlarged).  
 Fig. 7.—Fruits.

Plate xxii.

*Eucalyptus camphora.*

- Fig. 1.—Twig, with buds and fruits.  
 Figs. 2-3.—Individual leaves.  
 Fig. 4.—Sucker-leaf.  
 Fig. 5.—Section of bud.  
 Fig. 6.—Back view of anther, showing oil globule in connective (enlarged).  
 Fig. 7.—Front view of anthers.